

CLAIMS:

1. A magnetocaloric effect heterostructure comprising:
  - a core layer of a giant magnetocaloric material; and
  - an elastically stiff material layer coated on at least one surface of said core layer, said elastically stiff material layer restricting volume changes of said core layer during application of a magnetic field to said heterostructure.
2. A magnetocaloric effect heterostructure as defined in Claim 1, wherein said core layer of giant magnetocaloric material is a compound of  $\text{Gd}_5(\text{Si}_{1-x}\text{Ge}_x)_4$ .
3. A magnetocaloric effect heterostructure as defined in Claim 1, wherein said elastically stiff coating layer is a low-coercivity, high-magnetization material.
4. A magnetocaloric effect heterostructure as defined in Claim 3, wherein said coating layer of low-coercivity, high-magnetization material comprises an element selected from the group consisting of iron, cobalt, nickel and magnetic oxides.
5. A magnetocaloric effect heterostructure as defined in Claim 1, wherein said elastically stiff material layer is coated on opposite surfaces of said core layer.

6. A magnetocaloric effect heterostructure as defined in Claim 1, wherein said elastically still material layer substantially encapsulates said core layer.
7. A magnetocaloric effect heterostructure as defined in Claim 1, wherein said coating layer is applied to said core layer using a chemical vapor deposition process.
8. A magnetocaloric effect composite powder comprising a plurality of core particles of a giant magnetocaloric material, each of said core particles being encapsulated within a coating of elastically stiff material, said elastically stiff coating restricting volume changes of said core particles during application of a magnetic field thereto.
9. A magnetocaloric effect composite powder as defined in Claim 8, wherein said giant magnetocaloric material of said core particles is a compound of  $\text{Gd}_5(\text{Si}_{1-x}\text{Ge}_x)_4$ .
10. A magnetocaloric effect composite powder as defined in Claim 8, wherein said elastically stiff coating is a low-coercivity, high-magnetization material.
11. A magnetocaloric effect composite powder as defined in Claim 10, wherein said coating of low-coercivity, high-magnetization material comprises an element selected from the group consisting of iron, cobalt, nickel and magnetic oxides.
12. A magnetocaloric effect composite powder as defined in Claim 8, wherein said core particles are substantially spherical.

13. A magnetocaloric effect composite powder as defined in Claim 12, wherein said core particles have a diameter of about 30  $\mu\text{m}$  and said coating has a thickness between 50nm and 200nm.
14. A magnetocaloric effect composite powder as defined in Claim 8, wherein said coating is applied to said core particles using a chemical vapor deposition process.
15. A method for enhancing the magnetocaloric effect within a giant magnetocaloric material comprising the step of coating a surface of said giant magnetocaloric material with an elastically stiff material, said elastically stiff material restricting volume changes of said giant magnetocaloric material during application of a magnetic field thereto.
16. A method as defined in Claim 15, wherein said giant magnetocaloric material is a compound of  $\text{Gd}_5(\text{Si}_{1-x}\text{Ge}_x)_4$ .
17. A method as defined in Claim 15, wherein said elastically stiff coating is a low-coercivity, high-magnetization material.
18. A method as defined in Claim 17, wherein said coating of low-coercivity, high-magnetization material comprises an element selected from the group consisting of iron, cobalt, nickel, and magnetic oxides.
19. A method as defined in Claim 15, wherein said giant magnetocaloric material is coated on opposite surfaces.
20. A method as defined in Claim 15, wherein said giant magnetocaloric material is substantially encapsulated by said coating.

21. A method of enhancing the magnetocaloric effect within a giant magnetocaloric material comprising the step of restricting volume changes of said giant magnetocaloric material during application of a magnetic field thereto.
22. A method as defined in Claim 21, wherein said volume changes of said giant magnetocaloric material is restricted by a coating of an elastically stiff material.
23. A method as defined in Claim 22, wherein said elastically stiff material is a low-coercivity, high-magnetization material.
24. A method as defined in Claim 23, wherein said low-coercivity, high-magnetization material comprises an element selected from the group consisting of iron, cobalt, nickel, and magnetic oxides.
25. A method as defined in Claim 21, wherein said giant magnetocaloric material is a compound of  $\text{Gd}_5(\text{Si}_{1-x}\text{Ge}_x)_4$ .